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TECHNOLOGIES FOR ELECTRONICALLY ASSISTING NURSING COMMUNICATION

Peter Scott and Kevin Quick
*Knowledge Media Institute
The Open University, United Kingdom*

ABSTRACT

New information and computing technologies promise new virtual learning and communication opportunities within the real communities of health care professionals. The Assisted Electronic Communication project has been prototyping, administering and evaluating an integrated digital discourse, webcasting and digital newsletter system, for health care professionals within one such community - an acute UK National Health Service Hospital. The first two of these systems are discussed in this paper. The principal group of health care staff participating in this study were nurses, who were able to access and contribute to threaded, asynchronous discussions and themed information in the context of critical work documents, view and interact with live webcasts by key hospital personnel, and view and submit stories to an online newsletter. The system has been evaluated very positively, and is seen by staff as a way of critically engaging with new material that is getting closer to an idealized vision of learning in the workplace.

KEYWORDS

Digital Discourse Systems, Medical Informatics, Webcasting.

1. INTRODUCTION

Current policy contexts within the United Kingdom National Health Service (NHS) have set an agenda for improved delivery of care based on the effective management of information (Coiera, 1995; Black, 1998). A central vision of current health policy is that there is a direct link between increasing the participation of NHS staff in the decision-making process and the successful implementation of key policy changes. In particular enhanced clinical performance is seen to be directly associated with the development more open and efficient communication systems, (Department of Health, 1997).

One approach to the health care 'communication and information gap' lies in the development and application of information systems that can assist in the dissemination of best practices and enhance inter-professional collaboration, (e.g. Nauert, 1997). Research on Computer Mediated Communication (CMC) has identified that CMC technologies are capable of positively altering interaction patterns both in interpersonal and organizational relationships although this is dependent on the local context and culture of use being supportive of such change (McCarthy and Monk, 1994).

A critical understanding of the impact of the CMC technologies on the health care sector remains to be developed. In particular new technology systems need to be based on an understanding of health professionals communication processes and information needs. Commitment to computer based applications among health workers is likely to be higher if it is implemented in the context of a clear solution to a clinical or professional issue rather than being technology driven (Coiera, 1995). Secondly, it seems likely that the development of an understanding of how health care professionals currently (and ideally need to) communicate will prove as important as an exploration of any specialized technological communications infrastructure for health care (McCarthy and Monk, 1994). Thirdly, existing information technologies and particularly asynchronous systems (Coiera and Tombs, 1998) such as email, internet communication tools, and text-based conferencing systems that can take advantage of communication that is threaded and themed may hold the potential for rapid, cost-effective advances in the quality of clinical information and communication for health professionals. Asynchronous electronic communication is vital to enable mobile

and time-constrained professionals to communicate effectively and at convenient times. Threaded communication can establish and identify working dialogues within a collection of messages, and themed communication in a conferencing environment allows for the clear organization of information. However, above all of the technical features of such systems, the social context of the communication is significantly more important for the effective implementation of a meaningful digital discourse (Houde et al, 1998).

2. THE ASSISTED ELECTRONIC COMMUNICATION PROJECT

This paper reports on some elements of a large project that has prototyped, administered and evaluated a suite of systems to foster digital discourse amongst health care professionals. These integrate features from 3 robust systems developed within the Knowledge Media Institute of the Open University. The overall architecture of the CMC developments is illustrated in figure 1. In this paper we will discuss the first two of these elements (the digital discourse forums, and webcasting) and their impact on the community of an acute general hospital.

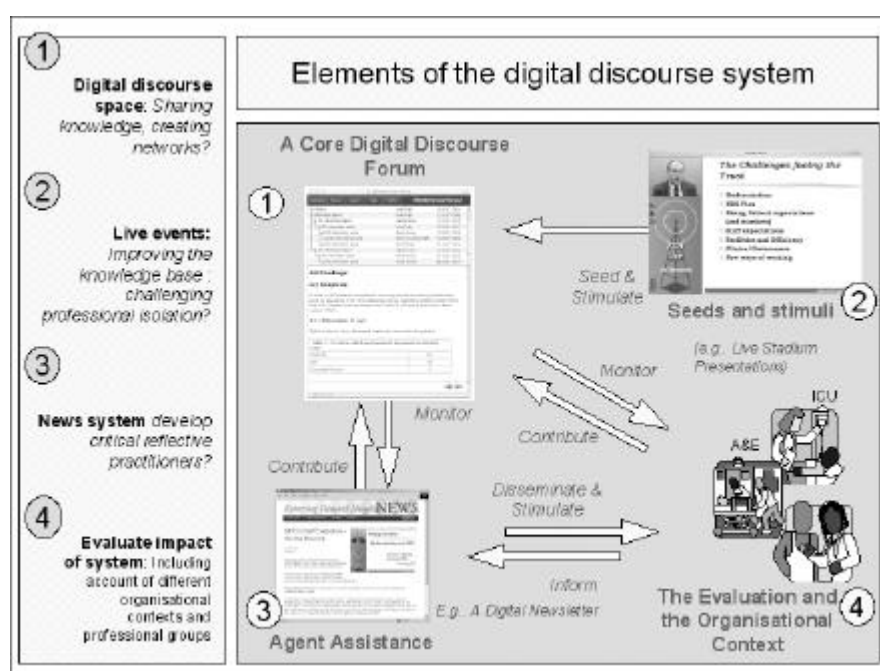


Figure 1. The CMC architecture for the General Hospital study.

We selected a typical small town general hospital in central England - Kettering General Hospital as the site for this study and chose initially to focus on staff in the Nursing and Midwifery discipline. Previous work in this hospital (see e.g. Brooks et al 2001) had provided a baseline analysis of the use of online communication (primarily email) prior to this study, which is discussed briefly below. As a further focus, we selected four distinct professional contexts within an acute setting for our initial work. The four key areas selected were: Accident and Emergency (A&E), the Coronary Care Unit (CCU), a general Medical Assessment Unit (MAU) and a general Medical Ward. These locations were chosen as those with a highest engagement in the first document to be released – a national standards document issued by the UK Department of Health on the treatment of coronary heart disease. The spaces selected in these areas all had staff rest facilities where some desk space could be found to locate a dedicated networked computer. The four selected areas cover approximately 100 Nursing staff, with very varied computer experience. At the start of the study we decided that no formal training in the use of the system was to be provided to these staff, but informal “show-and-tell” sessions were available to staff who were present when University researchers visited the areas. The machines used were designed for shared use, shift work, and without an email client available. The system in use is entirely web-browser based; with users clicking through web pages and

submitting forms in all interactions. The system is contained within the hospital Intranet, based upon a Windows NT™ server behind the NHS-Net firewall. The prototype system has been in operation at the hospital since January 2001. A detailed user evaluation, alongside an analysis of email content is underway.

2.1 The Document Discussion System

2.1.1 Overview

The first of the systems developed, aimed to help staff within an acute NHS Hospital Trust to access and contribute to threaded, asynchronous discussions and themed information relating to the implementation of critical health policy documents. At the centre of each discourse is an artifact, typically a document, which acts as a focus for the discussion. Contributions from participants are solicited via a browser based web forms interface. The contributions are text messages which are themed and threaded, and most importantly, are in the context of the document.

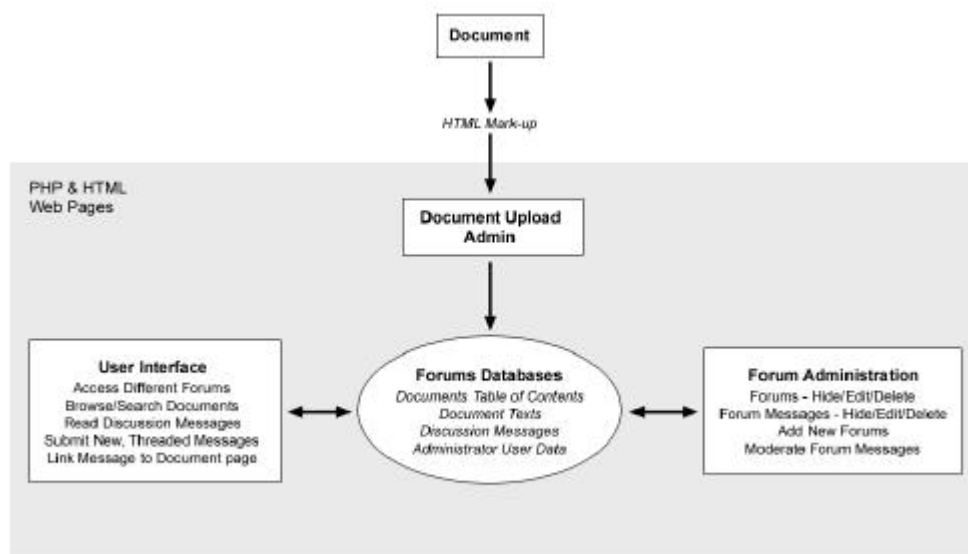


Figure 2. Document Discussion System structure

The system (see figure 2) is based around using the PHP scripting language (<http://www.php.net>), to dynamically generate web pages, and to read and write data to MySQL databases (<http://www.mysql.com>). The 'discussion' part of the Document Discussion System (DDS) is based on the Phorum open source discussion software (<http://www.phorum.org>), and this has significantly changed to suit the requirements of the DDS, and the environment in the hospital. The databases for the DDS contain document data (contents list, and document text), posted message data, and general forum properties (e.g. appearance, moderation etc).

2.1.2 Document Upload

Creation of new document discussion areas (referred to as 'forums' hereafter), or adding new documents to an existing forum, necessitates uploading the documents into the database. To do this the document must first be converted to a single HTML document, and headings and sub-headings labeled using appropriate 'heading' tags eg. <H1> for the document title, <H2> for chapter titles, <H3> for top level section headings.

The web based document upload interface, allows the user to select a forum, and a html document file to upload. The system then analyses the html, creating a table of contents, and dividing the text up into sections, and presents the user with an interface to preview the uploaded document, change the page breaks, and to upload any images associated with it (see figure 3). Finally, when all the necessary components are present the user can publish the document on to the system.

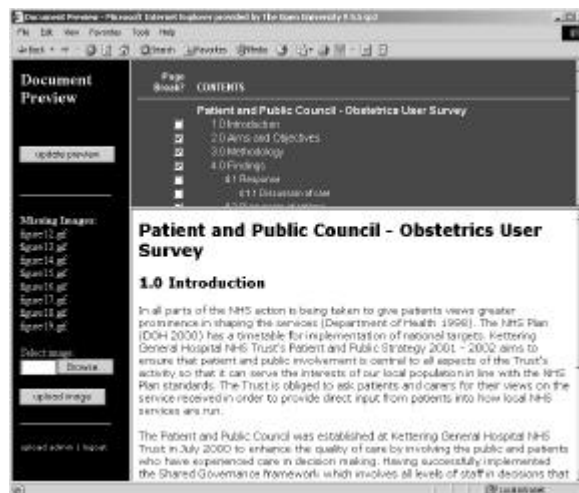


Figure 3. Document upload

2.1.3 The Forum's User Interface

In figures 4-6 we see a selection of screenshots, taken from the discussion interfaces to the National Service Framework for Coronary Heart Disease. Users can search for words in the document itself or in the associated forum text and can read and contribute to the discussion via a number of different views.

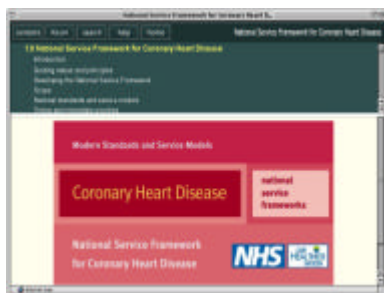


Figure 4. The front-page of the online NSF for Coronary Care.



Figure 5. A document search.



Figure 6. A threaded communication in the document.

The web pages that a user sees are divided horizontally into three sections. Firstly, at the very top, is a button bar with links to the various user pages. Secondly, below the button bar, is a frame containing either the contents list (expandable/collapsible providing links to document pages), or, the forum's message discussion pages. Thirdly, in the bottom portion of the page is a frame containing the document's pages. Users can search either the discussion messages, or the document pages, and with the latter the words searched for are highlighted in the document text (see figure 5.) The list of forum messages can be viewed either chronologically, threaded, or, as thread headings. Similarly, the full details of a posting can either be read with an associated thread view, or, as a flat listing of all the messages in a given thread.

When users submit a message to the forum, they can choose to link their message to the page of the document they are looking at. Someone reading such a message is provided with a link to take them to the associated document page. Additionally, if a person is just browsing through the document, links are inserted in the document pages to any associated forum messages.

2.1.4 Forum Administration

The administration of the forums is based on that provided through the "Phorum" system (see above), with additions made to create the necessary database tables, folders, and files for the documents associated with each discussion. Sample screenshots from some of the administration pages are shown in figures 7-9.

[illegible][illegible]

However, the biggest issue for all innovations in a busy health context is how staff can find the time to properly engage with the system. Interestingly, one group of staff – the Midwives – “made time” to make very effective use of all of the features that we provided.

I like it being chatty and gossipy, because that then engenders a professional development discussion. Please don't take it away!

It was really exciting to go in and see if anyone had added anything – I would sit there and think, I wonder what is going on now and then have to have a look.

It was good that we could have a say.

It is just so great to know that people still care about midwifery and don't just come in and do their job and go. It really re-motivated me.

2.2 Webcasts

2.2.1 The Webcast System

The second system integrated into this study was webcasting, and this has been based on the technologies developed for the KMi Stadium project at the Knowledge Media Institute of the Open University (kmi.open.ac.uk/stadium/).

A series of webcasts have now been produced at Kettering General Hospital, starting with a test transmission in November 2001, and followed by five further broadcasts, approximately two weeks apart starting at the end of January 2002. The topics of the broadcasts were chosen to be of direct relevance to the nursing staff, and included the Chief Executive, Head of Nursing, and the Hospital Chaplain etc.

The basic architecture of the system deployed is illustrated in figure 10.

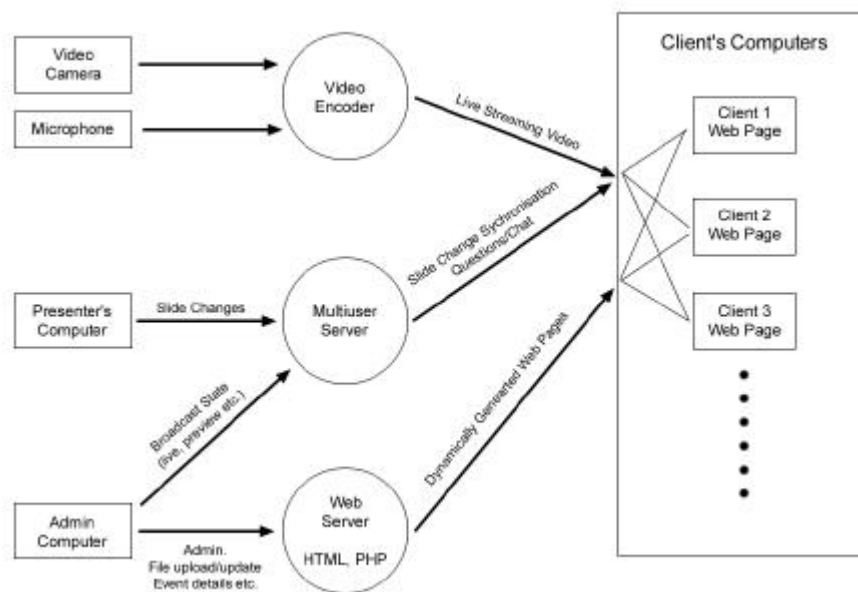


Figure 10. Stadium Technologies Webcasting Infrastructure

The client computers access the webcast via a Macromedia Shockwave™ applet (<http://www.macromedia.com>) embedded in a web page. They receive the streaming video and audio, together with the presenter's slides (see figure 11). Additionally, they can send text messages via the shockwave application to all connected computers, including the presenter.

Within the shockwave movie, used for the hospital webcasts, the video is a streaming QuickTime movie (<http://www.apple.com/quicktime/>) and the slides are presented via a Macromedia Flash™ movie (<http://www.macromedia.com>).

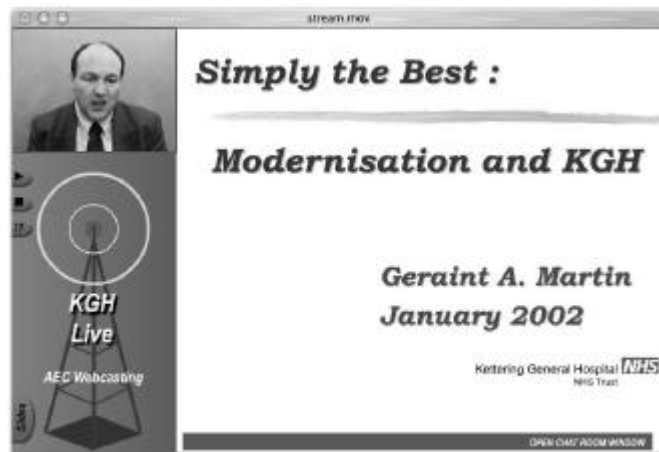


Figure 11. Screenshot from a webcast

The presenter uses a desktop computer with web access, and like the clients, connects to the same shockwave application, but does so as a "presenter", this enables additional functionality, allowing the presenter to control the slides currently being seen by the clients.

In addition to the presenter and clients, an administrator connects via the shockwave application in an "admin" mode. This gives the administrator the ability to change the state of the broadcast e.g. preview, live, intermission etc.

For the broadcasts at the hospital we used a low cost webcam and a tie-clip microphone. The audio and video from these was encoded using Sorenson Broadcaster (www.sorenson.com) and multicast.

During the broadcast the video is also recorded to file, together with the timing of slide changes, and any text chat that occurs. Subsequently, a replay QuickTime movie is created, which can be launched by visiting an appropriate web page, and can therefore be viewed by people unable to attend the original live broadcast, or, used as a resource for future training and education etc. Feedback from the staff (see below) indicates that these are particularly valuable for staff who normally feel excluded from such interactions – eg those who tend to work predominantly on a night-shift.

Initially the format for a broadcast was for the presenter to give their talk, and at the same time the remote participants could submit any questions they had via the chat interface. At the end, the presenter would scan through the text in the chat window, and reply to the questions. It became obvious that there were some problems with this, as the viewers found it distracting to have to compose and type in question, and the presenter found it difficult to scan and answer questions whilst still broadcasting. In previous uses of the webcasting software (see <http://kmi.open.ac.uk/stadium>), the chat interface had mainly been used for general discussion purposes rather than for asking questions of the presenter, whereas, within the context of the hospital webcasts it was being used almost exclusively for questions.

As a result, the format of the broadcasts was changed, so that at the end of the presentation there was an intermission of several minutes, during which period the presenter could review any questions that had been asked, and the viewers had a period in which they could type in questions without missing the broadcast. At the end of the intermission, the live video and audio would resume, and the presenter would then reply to the questions.

2.2.2 Feedback from the Nursing staff

Overall, attendance at the webcasts has been small, given that it was actively promoted in only 4 key areas of a small hospital (covering a maximum of 100 nurses). However, it is clear that the staff who did attend found the context to be fairly powerful.

"It certainly gathered people's imagination, because there were certainly a lot of people at watching it that I have never seen make comment on the project!" (Nurse, Sister; commenting on the Chief Exec webcast).

"The good thing about it was likes of us being able to ask questions of the likes of him". (Charge Nurse, Male; commenting on the Chief Exec webcast).

"Nurses have been told 'this is what you are doing, and this is how it is changing' and now it's gone full circle and nurses are being asked 'what do you think', well ... they are not used to that. Its getting them used to being able to express an opinion, without having any come-back". (Sister, Female).

"I think it is good, that you can come and have meetings, and share information, without pulling people out of clinical areas. I mean, if you go to a meeting that say lasts for quarter of an hour, you are 10 minutes getting there and 10 minutes back - that's three quarters of an hour out of the clinical area. Whereas, with the webcast, you are only taking up the 15 minutes. And if it is not a dire emergency, you can say 'just a minute' ..." (Sister, Female)

Again, the critical factor for non-attendance seems to have been "time". Not necessarily that the participant had no time available, but that (even more so, for a 'necessarily synchronous' activity) it is hard to get staff to free time for a new activity unless they can clearly understand how it relates to the other, more conventional, demands upon them.

3. CONCLUSION

In general the potential of computer mediated communication to offer real solutions to real clinical and health care delivery issues was clearly demonstrated by nursing staff in this study. Many of them engaged well with the technical systems, which we embedded in their working spaces. The decision to offer minimal training was essential to test the real take up of such an innovation – ie. a system requiring extensive training would be a useless technology in the nursing context! The most enthusiastic staff participated in an informal "peer-training" model that was a testament to their engagement with the system. Furthermore there is very good evidence of staff sharing knowledge and 'best practice' across specialist areas very effectively. There is also clear evidence that the systems have had substantial and measurable policy effects in the hospital in areas as diverse as bringing the Chief Executive to serve a night shift on a medical ward and changing the hospital drinks policy!

The final technology, which is currently running in the hospital but has not yet been fully evaluated, is the integrated agency and support system used to manage news in a virtual community (<http://cnm.kmi.open.ac.uk/projects/rostra/>).

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